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ABSTRACT

The theory and practice of education have been profoundly influenced since 1900 by the educational research and the educational testing movements. These movements deserve greatly increased historical research. Many current innovations in education have been tried in the past and found wanting. Study of the pioneer educational researches reveals the discovery of educational principles still accepted and those which have been modified as a result of more recent research. The Progressive Education Movement has been subjected to much historical research. Similiar study of the educational research and of the testing movements might reveal comparable effects on instructional objectives, methods, and materials. Much of the history of educational research and measurements has dealt with the efforts of various persons -- G. Stanley Hall, Dr. J. M. Rice, E. L. Thorndike, and so on. There has been little concern for conditions producing, and influenced by, these movements. How much is to be credited to awareness of individual differences and abandonment of formal discipline? To what extent was the Committee of Ten appointed in 1892 by the NEA s stimulus to educational research? What effect did the scientific management movement have on educational testing and research? (It affected J. M. Rice and Leonard Ayres.) How has the development of statistical methods influenced the quality of educational research? (Author)

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The Value and Need for Research on the History of the Educational Research and Measurements Movements

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The theory and practice of education have been profoundly influenced since 1900 by the educational research and the educational testing movements. These movements deserve greatly increased historical research. Such research should contribute to the solution of contemporary problems. Many current innovations in education have been tried in the past and found wanting. Study of the pioneer educational researches reveals the discovery of educational principles still accepted and those which have been modified as a result of more recent research. The Progressive Education Movement has been subjected to much historical research. Similar study of the educational research and of the testing movements might reveal comparable effects on instructional objectives, methods, and materials.

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The invention of the questionnaire has been attributed to Sir Francis Galton. It was used, however, as early as 1836 to collect educational data. Its use was criticized in 1839 and in 1841 in much the same way as it is today. "Those returns were professedly and from the very nature of the mode of inquiry, partial and imperfect," and "It is impossible to expect accuracy in returns obtained by circulars, various constructions being put upon tne same question by different individuals...." In 1856, Henry Barnard reported a questionnaire survey of educational conditions in Connecticut. Also in 1856, Sigismund and Lazarus in 1870 collected essentially questionnaire data with reference to the "contents of children's minds." G. Stanley Hall conducted similar studies beginning in 1880. "A written questionnaire of 100 items was read aloud to pupils by their teachers."* It is evident that Hall was most responsible for initiating the child study movement.

Other survey-type studies which tended to increase understanding of the significance and range of individual differences were the 1904 report of age-grade data of public elementary school pupils of New York City of Superintendent W. H. Maxwell, the 1907 survey of E. L. Thorndike entitled "The Elimination of Pupils from School," and Leonard Ayres 1909 research: "Laggards in Our Schools."*

In 1901, E. L. Thorndike and R.S. Woodworth reported experimental evaluation of "The Influence of Improvement in One Mental Function Upon the Efficiency of Other Functions."** This study and other later studies of transfer of training were instrumental in

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* For the original sources of the reports cited above, see:

Walter S. Monroe and others. Ten Years of Educational Research, 1918-1927. Bureau of Educational Research Bulletin No. 42. Urbana: University of Illinois, 1928, pp. 36-38.

** Psychological Review 8:247-61; 384-95; 553-64; 1901.

the abandonment of formal discipline. School subjects had to be justified in terms of values inherent in them rather than as means of development of "mental faculties" or in "training the mind or will." It is disconcerting, however, to discover in the Thorndike-Woodworth experimentation use of an experimental group of six subjects and a control group of eight. Possibly the importance of using larger and representative samples of subjects required greater understanding of the range of individual differences.

Experiments conducted under school conditions in the United States prior to World War II were usually characterized by the use of an experimental and a control group "equated" by means of an intelligence test or an initial achievement test. Rarely were the pupils assigned at random to the compared instructional procedures. An exception was a large scale research reported by Walter S. Monroe in 1929, "How Pupils Solve Problems in Arithmetic.* Four very large groups of pupils each were selected at random by having four tests arranged in alternate order, distributed to pupils as they were seated in their classrooms.

Although "Student" (W.S. Gosset) contributed the *t* ratio and its sampling distribution in 1908** and R.A. Fisher first introduced the analysis of variance in 1923,*** little use was made of these techniques by educational researchers in the United States prior to 1940. W.A. McCall presented his experimental coefficient in his How to Measure in Education of 1922 and his How to Experiment in Education of 1923. (A difference to be

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* Bureau of Educational Research Bulletin No. 44. Urbana: University of Illinois, 1929.

** "Student," The Probable Error of a Mean." Biometrika 6:1-25; 1908.

*** R.A. Fisher. Statistical Methods for Research Workers. (1st ed.) 1925.

(The analysis of variance appeared in an agricultural journal in 1923.)

significant in a one-tailed test had to equal 2.78 times the standard error of the difference.) It is evident that McCall understood the importance of random samples and random assignment to treatments in obtaining equivalent groups. It is also evident that he had some understanding of degrees of freedom since he suggested subtracting 1,2, and 3 from n's equal to or less than 30.

It is likely that the requirement that a difference exceed 2.78 times its standard error to be significant (compared with the contemporary 1.64 or 1.96) contributed to the disillusion with school experimentation in the 1930's. This disillusion was accompanied by an increase in salutory critical attitudes.

In his Common Schools Journal of 1845, Horace Mann reported examination data obtained in seventeen Boston schools and one in Roxbury. The tests were prepared by examining committees for which Mann disclaimed responsibility. The next widespread testing to obtain comparative data was conducted by Dr. J. M. Rice in spelling, arithmetic, and composition.* The data were reported in Forum magazine and later republished in his book Scientific Management which appeared in 1913. His advocacy of city-wide testing as a means of evaluating the efficiency of principals and teachers and the title of his 1913 book seems to the present author to diminish the luster of his well-deserved recognition as a founder of the progressive movement in education along with Colonel Francis Parker and John Dewey. His work did stimulate the far more important contributions to the measurement movement made by E. L. Thorndike, his disciples S.A. Courtis and C. W. Stone, and by Leonard Ayres, Lewis M. Terman and many others. The production

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* Max D. Engelhart and Macklin Thomas. "Rice as the Inventor of the Comparative Test." Journal of Educational Measurement 3:141-45; 1966.

of standardized intelligence, achievement, and personality tests proliferated between 1908 and 1928. By 1928, thirteen hundred tests and scales had been produced and standardized, or partially standardized. There were approximately 150 intelligence tests. There were more than 50 tests in each of the following school subjects: arithmetic, reading, language and grammar, and history. There were standardized tests in practically every elementary and high school subject and in most college subjects. It was estimated in 1928 between thirty and forty million copies of tests were used annually, about one standardized test per pupil.*

The number of tests per pupil has probably greatly increased. The number of tests available in print, however, has increased to only a little more than 2,000. The improvements in test theory and methodology and the development of more critical attitudes has resulted in the production of far better tests. The Buros Mental Measurements Yearbooks and the APA, AERA, and NCME Standards for Educational Tests and Manuals have contributed to this.

In recent years concern has grown with reference to the social effects of testing, creating problems deserving historical research.

How much the 1893 report of the Committee of Ten stimulated educational research is uncertain, but it advocated subordinating preparation for college, the "fitting" function, to preparation of all pupils for the duties of life, the "finishing" function. It is also recommended that all high school subjects should be taught in the same way so that students who do perform creditably can enter college, a recommendation that encouraged domination of the high schools by colleges and universities. The thinking of the Committee still conformed

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* See Charles W. Odell's chapter on the early history of research in educational and psychological measurement in Ten Years of Educational Research, 1917-1928, op.cit. pp. 88-115.

to faculty psychology, or formal discipline. The report antedated the research of E.L. Thorndike and others dubious of such doctrines. The 1918 report of the Commission on the Reorganization of Secondary Education entitled "Cardinal Principles of Secondary Education" recommended far broader and explicit educational objectives.*

The need for more historical research on the educational research and measurement movements has been emphasized above. In the first nine volumes of the History of Education Quarterly, there are only three papers directly relevant to the educational research and testing movements. They are: "The Quest for a Science of Education in the Nineteenth Century" by James R. Roberts (Winter 1968), "Leonard Ayres and the Educational Balance Sheet" by Raymond E. Callahan (March 1961), and "The Vanishing Genius: Lewis Terman and the Stanford Study" by Gretchen Kreuter (March 1962). There should be more studies similar to "Thorndike's Impact on the Teaching of Arithmetic" possibly by Lawrence Cremin and reported in Research for Tomorrow's Schools (1970).

Good sources for the study of the early history of educational research are the first volumes of such journals as School Review (1892-), Teachers College Record and Elementary School Journal (1899-), Journal of Educational Psychology (1910-), Journal of Educational Research (1920-), Journal of Experimental Education and Review of Educational Research (1932-). Additional useful sources are the Yearbooks of the National Society for the Study of Education (1900-), the Supplementary Educational Monographs (1917-), and the Teachers College, Columbia University, Contributions to Education (early 1900's). The publications of the United States Bureau of Education and of pro-

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* U.S. Bureau of Education Bulletin, 1918, no. 35.

See: Chapter V, "Curriculum Research," in Ten Years of Educational Research, 1918-1927, op.cit., pp. 116-88, and Bureau of Educational Research Bulletin No. 41, Reconstruction of the Secondary School Curriculum: Its Meaning and Trends. Urbana: Illinois, 1928.

fessional organizations should also be consulted. Documentation in Education by Arvid J. and Mary A. Burke is a valuable source of information concerning the publications listed above.

Among the best sources of information concerning the early history of the educational research and measurements are Bureau of Educational Research Bulletins41, 42, 48, 51, and 58. Their titles are:

41. Reconstruction of the Secondary-School Curriculum: Its Meaning and Trends, (1928)

42. Ten Years of Educational Research, 1918-1927. (1928)

48. Experimental Research in Education. (1930)

51. Stimulating Learning Activity. (1930)

58. A Critical Summary of Research Relating to the Teaching of Arithmetic. (1931)